

TELEPHONE ADAPTOR APPARATUSFIELD OF INVENTION

The present invention relates to a telephone adaptor apparatus for connecting a cellular network of a mobile telephone to a corded or cordless stationary handset and relates particularly, though not exclusively, to such an adaptor apparatus for connecting a conventional stationary telephone (without land-line connection) to a cellular network.

BACKGROUND TO THE INVENTION

In recent years mobile telephones have become more widely used, and are extremely popular with professional, business and trades people because of the increased accessibility for clients they afford. One disadvantage of having a mobile telephone is that the user then typically has two telephone numbers; one for the mobile and one for his/her land-line telephone. If the user wants to use the mobile in place of the land-line telephone, so that he/she has only one telephone number, there are some features of a mobile telephone that are inconvenient for this purpose. If the user employs the mobile telephone in an office or home environment, where lengthy telephone calls are not uncommon, the mobile telephone can become quite heavy and warm when held to the ear for extended periods. There is also the problem of limited battery life which restricts the length and number of calls that can be made before re-charging. Also, health and safety concerns have been raised in connection with the levels of RF electromagnetic radiation generated by mobile telephones during transmission, in such close proximity to the user's brain.

SUMMARY OF THE INVENTION

The present invention was developed with a view to providing an adaptor apparatus capable of controlling the operation of a mobile telephone so that a light-weight stationary

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telephone handset can be used to connect to the cellular network of the mobile telephone. The present invention does not link a conventional land-line telephone to a wireless cellular network, however it can be used to connect such a conventional telephone (land-line absent) to the cellular network via a mobile telephone.

According to the present invention there is provided a mobile to stationary telephone adaptor apparatus for connecting a cellular network of a mobile telephone to a corded or cordless stationary telephone handset, the apparatus comprising:

a docking station for the mobile telephone;

a controller operatively connected to the docking station and adapted to be operatively connected to the stationary telephone handset, for controlling operation of the mobile telephone when mounted and activated in the docking station whereby, in use, the stationary telephone handset can be employed by a user to connect to the cellular network.

In one embodiment, the apparatus further comprises a stationary telephone handset provided in connection with the docking station. Optionally, the docking station also includes an auxiliary keypad for dialling out using the stationary telephone handset. In another embodiment, said stationary telephone handset and auxiliary keypad are the handset and keypad of a conventional stationary telephone which is connected to the controller instead of being connected to a land-line.

Preferably said controller is housed within the docking station. Advantageously the apparatus further comprises a battery charger housed within the docking station and

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arranged to charge the mobile telephone's battery in a standby mode under the control of said controller.

BRIEF DESCRIPTION OF DRAWINGS

In order to facilitate a better understanding of the nature of the invention a possible embodiment of the telephone adaptor apparatus will now be described in detail, by way of example only, with reference to the accompanying drawings in which:

Figure 1 is a block diagram illustrating functional components of one embodiment of the telephone adaptor apparatus;

Figure 2 is a conceptual diagram illustrating how the telephone adaptor apparatus of Figure 1 may be used to connect to a cellular network; and,

3a, 3b and 3c
Figure 3 is a flow chart illustrating an operating sequence of the telephone adaptor apparatus of Figure 1.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

One possible embodiment of a telephone adaptor apparatus 10 in accordance with the present invention is illustrated in Figure 1 in block diagram form. The telephone adaptor apparatus 10 comprises a docking station 12 for a mobile telephone 14. Mobile telephone 14 can be used to establish a link to a mobile telephone switching office (MTSO) when turned on, via a cellular network. The adaptor apparatus 10 further comprises a controller 16 operatively connected to the docking station 12 for controlling operation of the mobile telephone 14. In this embodiment, most of the control functions of controller 16 are provided by the central processing unit (CPU) of a suitable microprocessor. Any suitable microprocessor may be employed. In this embodiment an Intel 8051 chip set, including multiplexers, is employed. The microprocessor is connected to the docking station via a

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male/female plug/socket combination. Docking station 12 typically has an injection moulded plastics material outer casing (not illustrated) shaped to receive the mobile telephone 14 therein in a docking position. Typically, the docking station 12 has a male electrical connector 19 provided therein which is received in a corresponding female connector provided within the base of the mobile telephone 14. A fourteen (14) line ribbon cable 18 connects the connector 19 to the microprocessor 16. The fourteen lines carry the following signals:

1. Audio input
2. +5 volt = external power, 0 volt = battery
3. Public address (PA) speaker control.
4. Audio ground
5. Audio output
6. Power-on indicator
7. Charger control
8. Digital/DC ground
9. OV = normal, -5V = test, +12V = test & flash
10. Hangup signal (off-hook)
11. TTL serial input
12. TTL serial output
13. Power toggle (hold low for 1 sec)
14. DC power supply in.

Preferably, the mobile telephone 14 when received in the docking station 12 in the docking position is mounted so that a dial pad of the mobile telephone 14 is still readily accessible to a user. In this way, the dial pad of the mobile telephone 14 may still be used if desired to make outgoing telephone calls, even when the mobile telephone 14 is in the docking position.

In this embodiment, telephone adaptor apparatus 10 further comprises a stationary telephone handset 20, in the form of a cordless listening set 20. The cordless listening set 20 is operatively connected to the controller 16 and may be used

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by the operator to answer incoming calls or to make outgoing calls. The outer casing of the docking station 12 is also adapted to receive the cordless listening set in an on-hook position. The cordless listening set 20 may itself be
5 provided with an auxiliary keypad or the docking station 12 may be provided with an auxiliary keypad 21 operatively connected to the controller 16, to be used in place of the dial pad of the mobile telephone 14 for making outgoing calls.

10 Advantageously the telephone adaptor apparatus 10 further comprises a battery charger unit 22, which is preferably also housed within the outer casing of the docking station 12. When the mobile telephone 14 is received in a docking
15 position in the docking station 12, and is not being used to make any outgoing or incoming calls, battery charger 22 is adapted to "trickle charge" the rechargeable battery of the mobile telephone 14 in a standby mode. The battery charger
20 unit 22 is also under the control of controller 16 which detects when the mobile telephone 14 is in a standby mode and initiates or terminates charging of the mobile telephone battery accordingly.

Whenever the mobile telephone 14 is in the docking position, power is preferably supplied to the mobile telephone by the docking station 12. In this way, the internal battery of the
25 mobile telephone 14 is not depleted unnecessarily during incoming and outgoing calls using the stationary telephone handset 20.

The telephone adaptor apparatus 10 of the present invention may also be used in connection with a conventional corded or
30 cordless stationary telephone which is not connected to a land-line. As shown in Figure 1, a conventional telephone 24 is operatively connected to the controller 16 of the adaptor apparatus 10 by a standard telephone connector. In such an arrangement, the keyboard and handset of the conventional

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telephone 24 will replace the telephone handset 20 and auxiliary keypad 21 of the telephone adaptor apparatus 10. The conventional telephone 24 may be used for making both incoming and outgoing calls via the cellular network and mobile telephone 14. Controller 16 performs off-hook monitoring of the conventional telephone 24 in order to detect when a user wishes to make an outgoing call using the telephone 24. The manner in which the telephone adaptor apparatus 10 may be used will now be described in greater detail with reference to Figures 2 and 3.

The docking station 12, which incorporates controller 16, a telephone handset 20 and a battery charger 22 is connected to an outlet of the conventional AC power grid. When in the "ON" condition the controller 16 monitors the status of the mobile telephone 14 for incoming or outgoing calls. A typical operating sequence of the telephone adaptor apparatus is illustrated in Figure 3. When the apparatus 10 is switched on at step 100, the controller 16 firstly detects whether the mobile telephone 14 is connected to the cellular network at step 101. Once the mobile telephone 14 has been switched ON at step 102, it can establish a link to the mobile telephone switching office (MTSO) which is linked to the public telephone switching network (PTSN). At step 103 the controller 16 determines whether the user wishes to make an outgoing call, for example, by detecting the off-hook signal from the docking station telephone handset 20. If no outgoing call is being made, the controller 16 waits for an incoming call at step 105 in the standby condition. In the standby condition the controller supervises trickle charging of the mobile telephone battery at step 106. When there is an incoming call, the controller 16 detects the ringing tone of the mobile telephone from the PTSN, and proceeds to check the connection to the MTSO/PTSN at step 107. When a good connection is made, the user is given the option of picking up the stationary telephone handset 20 or the mobile telephone 14 itself.

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On the other hand, if the user wishes to make an outgoing call, he/she dials the telephone number using the dial pad of the mobile telephone 14 at step 104 and presses the "send" button of the mobile telephone 14. Once again, controller 16
5 monitors the connection to the MTSO/PTSN to detect a ringing tone at step 108. If an engaged tone is detected at step 109, the user can press the "redial" button on the mobile telephone 14 followed by the "send" button at step 110. When a good line connection is made, the user can choose to
10 continue with the use of the mobile telephone 14 or to pick up the stationary telephone handset 20.

When there is an incoming call, the controller 16 detects whether an off-hook signal is present at step 111. If no off-hook signal is detected, indicating that the stationary
15 telephone handset 20 has not been picked up, the controller 16 will disconnect the incoming call after a specified time limit at step 113. However, if an off-hook signal is detected, a ringing signal will be generated and the user must press the "accept call" button on the mobile telephone
20 14 at step 112 to accept the incoming call. At this stage, the controller 16 will multiplex the mobile telephone's audio and microphone lines to the docking station and indicate that the stationary telephone handset 20 is available to use if desired. The user may pick up the docking station telephone
25 20 at step 115 to answer the incoming call. Once the telephone call is completed at step 116, the user then presses the "end" button on the mobile telephone or he can slot the Mobile onto the docking station 12, which will automatically trigger the Mobile 14 to go into the off-hook or hang-up mode - thereby terminating the PSTN/MS
30 or hang-up mode - thereby terminating the PSTN/MS link.

It will be seen that the controller 16 effectively slaves the stationary handset 20 to the mobile telephone 14 which is designated the master. When the telephone conversation is ended, control reverts back to the master or mobile telephone
35 14. The telephone adaptor apparatus 10 can also slave a

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conventional (land-line absent) telephone 24 to the mobile telephone 14, as noted above. In this case, a modified operating sequence will be followed for incoming and outgoing calls. It may also be possible to use the docking station auxiliary keypad 21, or the dialpad of the stationary handset 20 or conventional telephone 24, in addition to the mobile's keypad, to make outgoing telephone calls. To dial out using some keypad other than the Mobile's own - the microcontroller will detect the sequence of typically seven DTMF tones of the auxiliary keypad and communicate with the Mobile's embedded processor via the serial port of the handphone. Upon successful execution of the protocol/handshake between the controller of the Docking station and that of the handphone, the serial link of the handphone will be opened up for the "dispatch" of the dialled number to the MTSO (also known as MSC - mobile switching centre).

The docking station 12 can accept any "commercial, off-the-shelf" mobile telephones, be they GSM, E.TACS, PCN or AMPS.

From the above description of a preferred embodiment of the telephone adaptor apparatus according to the invention, it will be apparent that the apparatus provides a number of advantages, including the following:

- (a) a conventional telephone or telephone handset (less land-line connection) may be used to connect to a cellular network of a mobile telephone;
- (b) a lengthy telephone conversation may be continued (without audio drop-out) by docking the mobile telephone and picking up the stationary telephone handset;
- (c) the mobile telephone's battery will be recharged in a standby mode during "idle" time;

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(d) fax data or computer data from personal organisers or modems can be sent once the correct control sequences have been established;

5 (e) the apparatus is portable and can be used anywhere provided there is a power supply;

(f) it enables a user to do without a land-line, hence requiring only one telephone number (mobile telephone number); and,

10 (g) the device is simple to use and enables safe and comfortable wireless voice telecommunication via a conventional telephone handset.

15 Numerous variations and modifications will suggest themselves to persons skilled in the telecommunication arts, in addition to those already described, without departing from the basic inventive concepts. For example, the telephone adaptor apparatus may incorporate a speaker-phone for hands-free voice communication. It may also incorporate a call answering machine, caller identification features, a facsimile machine and/or modem. All such variations and
20 modifications are to be considered within the scope of the present invention, the nature of which is to be determined from the foregoing description and the appended claims.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A mobile to stationary telephone adaptor apparatus for connecting a cellular network of a mobile telephone to a corded or cordless stationary telephone handset, the apparatus comprising:
- 5 a docking station for the mobile telephone;
- a controller operatively connected to the docking station and adapted to be operatively connected to the stationary telephone handset, for controlling operation of the mobile telephone when mounted and activated in the docking station whereby, in use, the stationary telephone handset can be employed by a user to connect to the cellular network.
- 10 2. A telephone adaptor apparatus as defined in claim 1, further comprising a stationary telephone handset provided in connection with the docking station.
- 15 3. A telephone adaptor apparatus as defined in claim 2, further comprising an auxiliary keypad for making outgoing telephone calls using the stationary telephone handset.
- 20 4. A telephone adaptor apparatus as defined in claim 1, wherein said stationary telephone handset is the handset of a conventional telephone which is connected to the controller instead of being connected to a land-line.
- 25 5. A telephone adaptor apparatus as defined in claim 1, wherein said docking station is provided with an outer casing and said controller is housed within the outer casing of the docking station.
6. A telephone adaptor apparatus as defined in claim 5, further comprising a battery charger operatively connected

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to the controller and adapted to charge a battery of the mobile telephone in a standby mode.

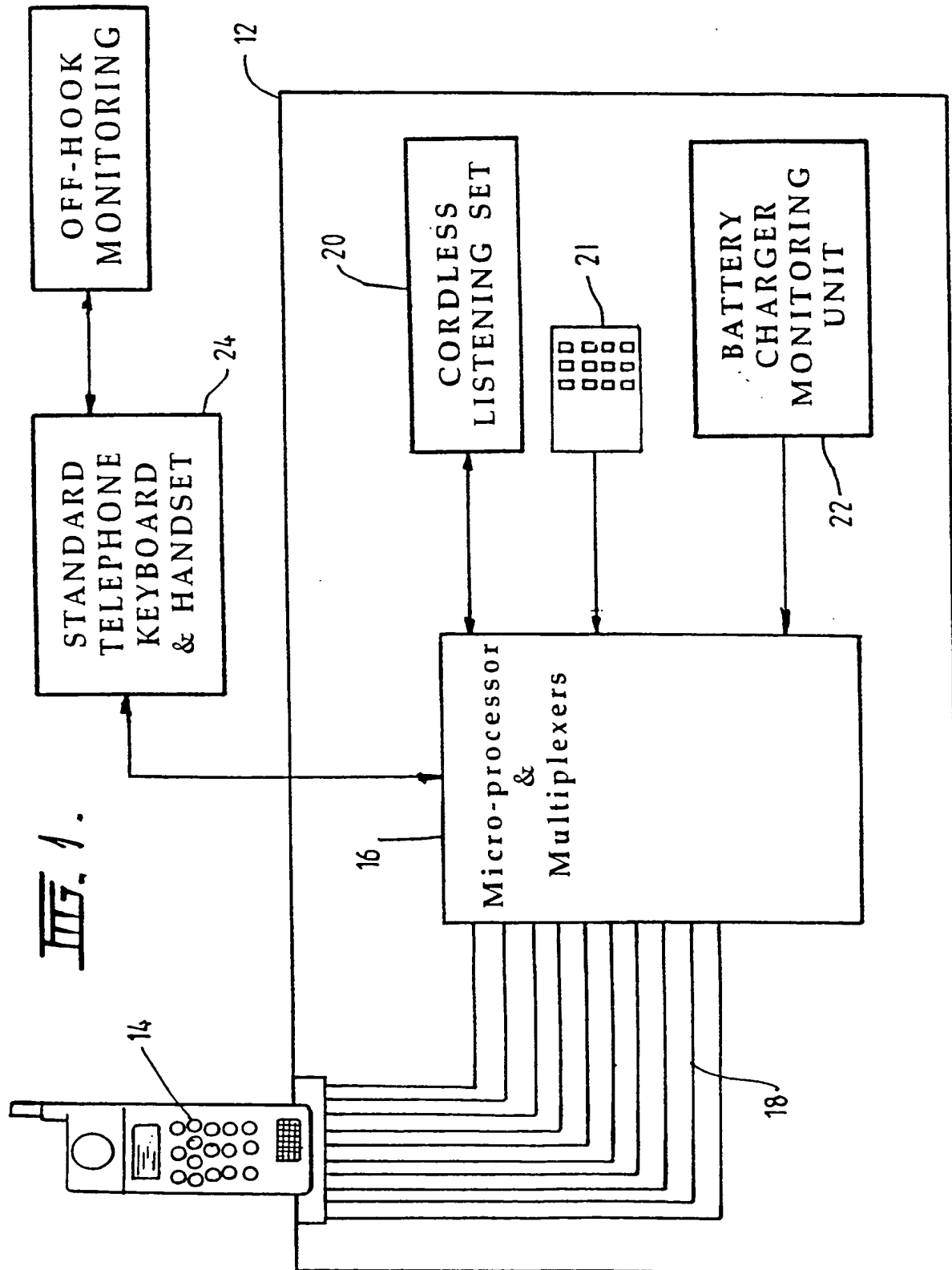
7. A telephone adaptor apparatus as defined in claim 6, wherein the battery charger is also housed within the outer casing of the docking station.

8. A telephone adaptor apparatus as defined in claim 1, wherein said controller includes means for detecting a ringing tone received via the mobile telephone to indicate an incoming call.

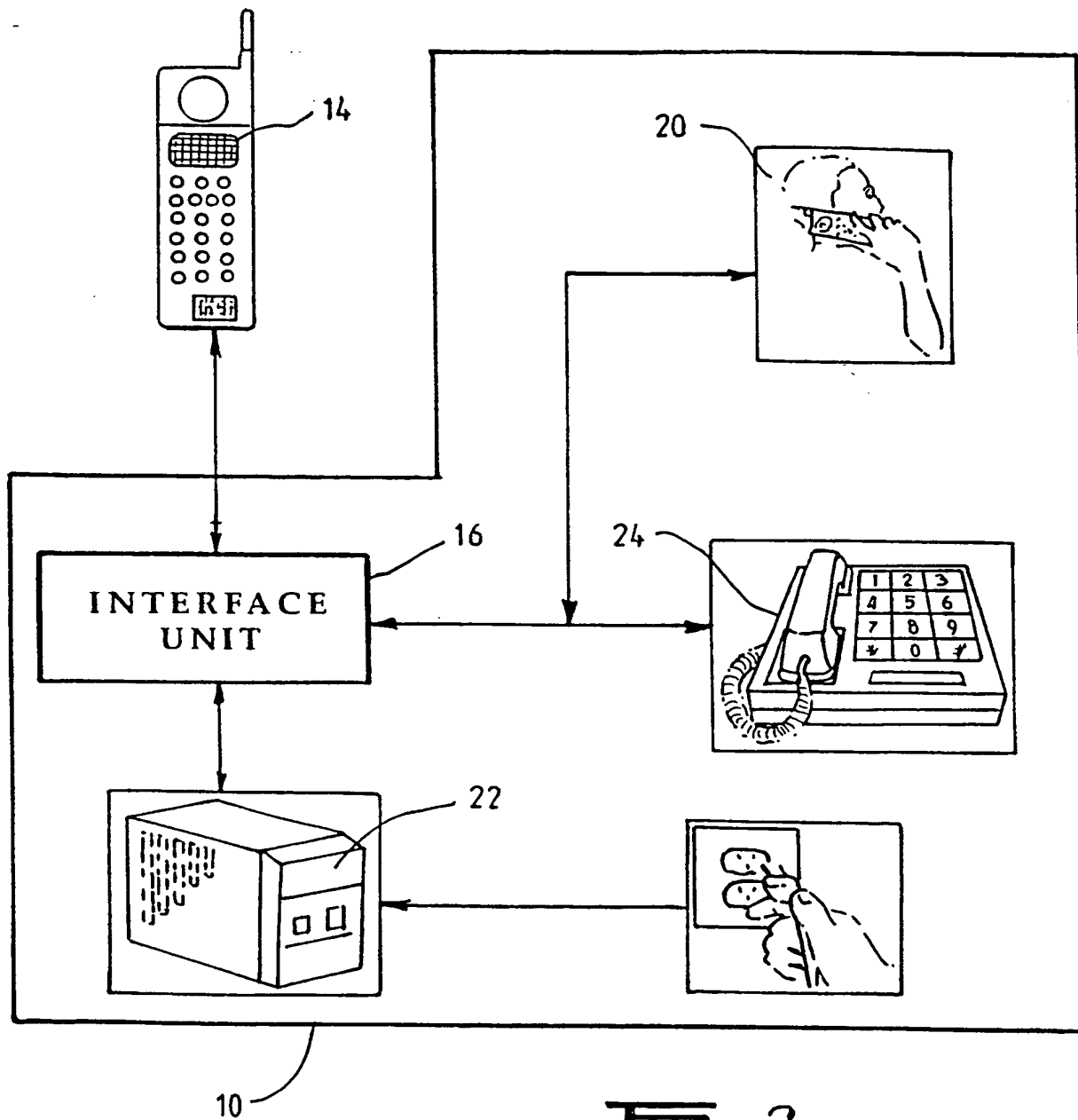
9. A telephone adaptor apparatus as defined in claim 2, wherein said controller includes means for multiplexing the mobile telephone's audio and microphone lines to the docking station whereby, in use, the stationary telephone handset can be used to accept an incoming call or to make an outgoing call.

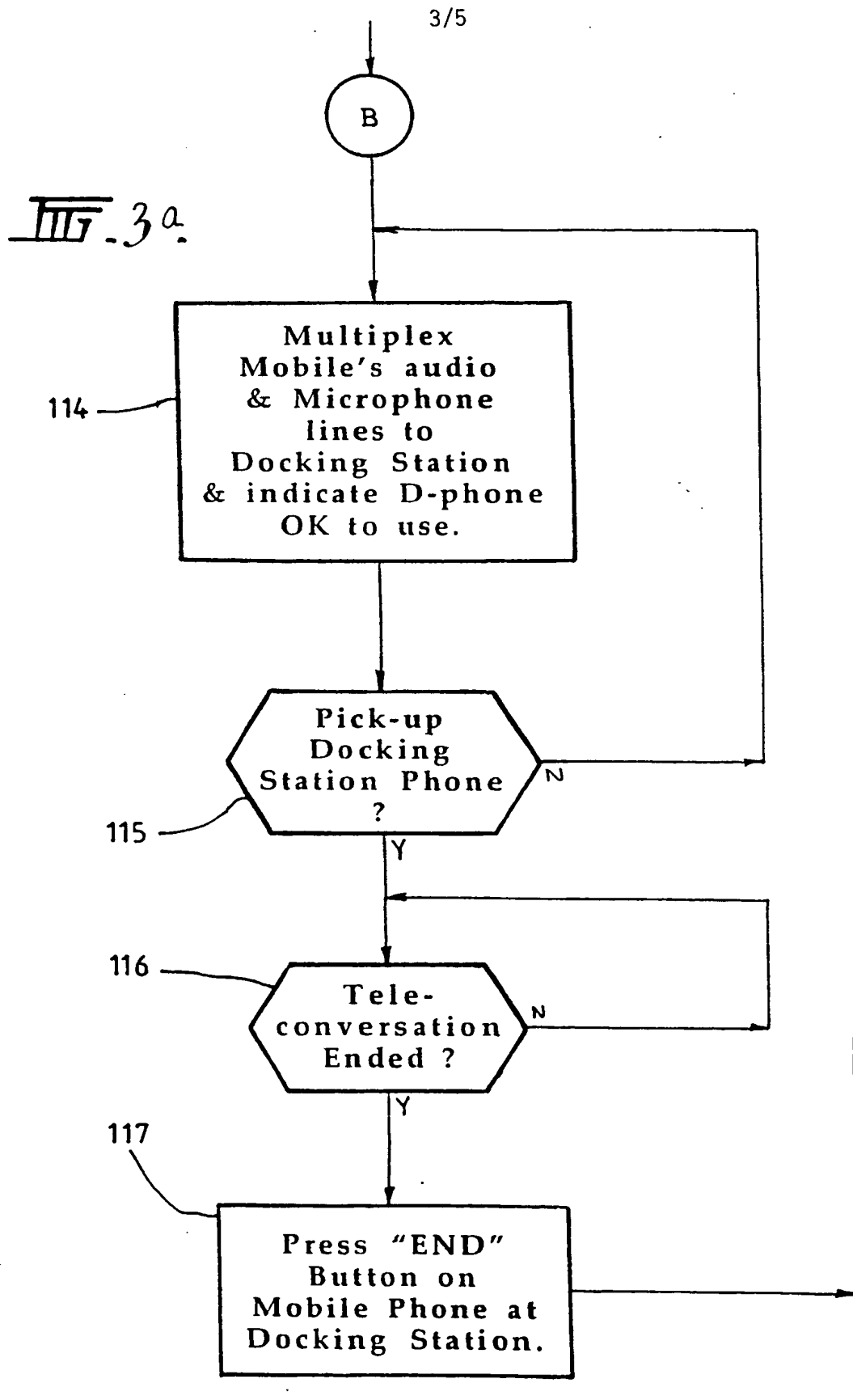
10. A telephone adaptor apparatus as defined in claim 9, wherein said controller includes means for detecting an off-hook condition of the stationary telephone handset.

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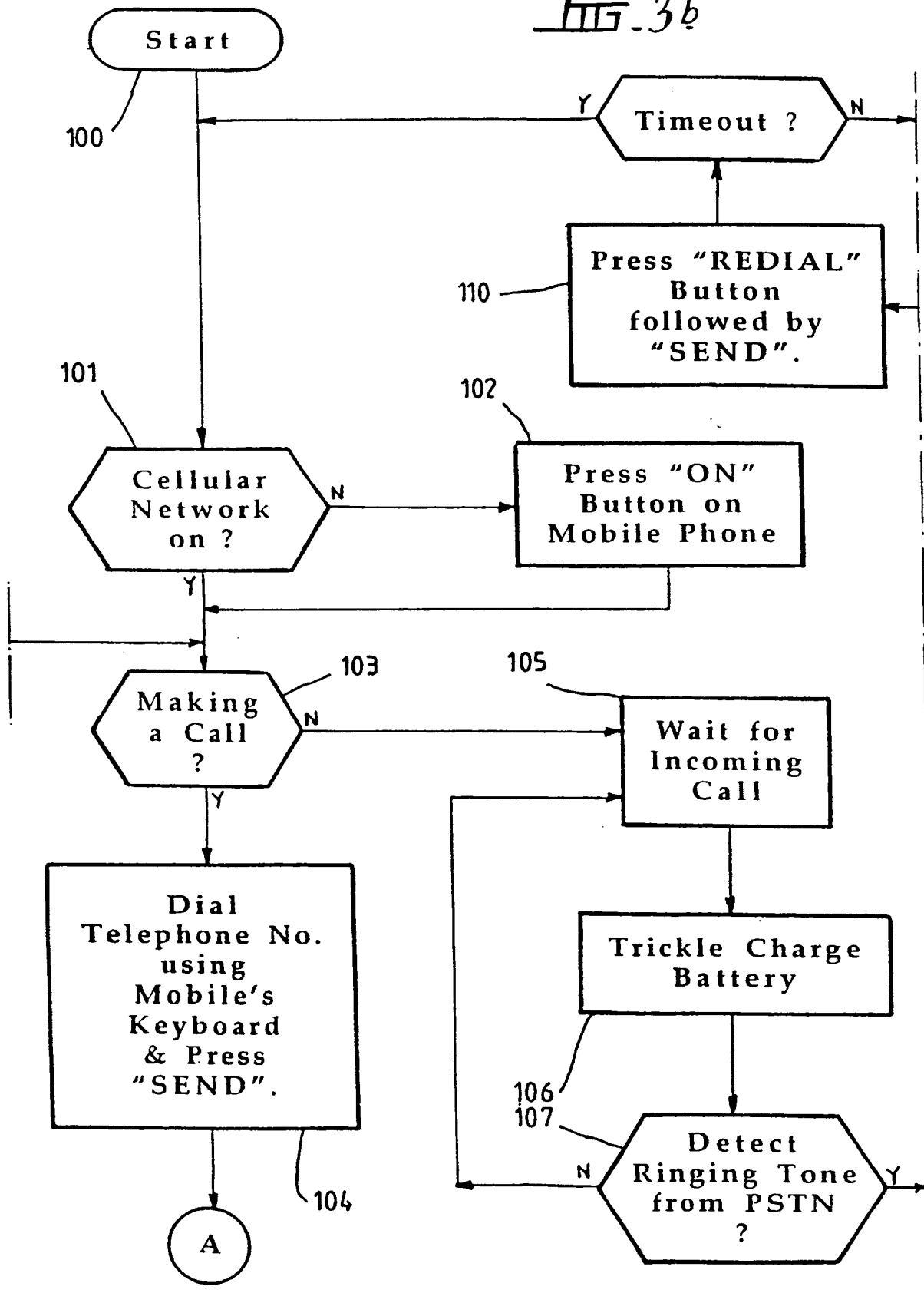


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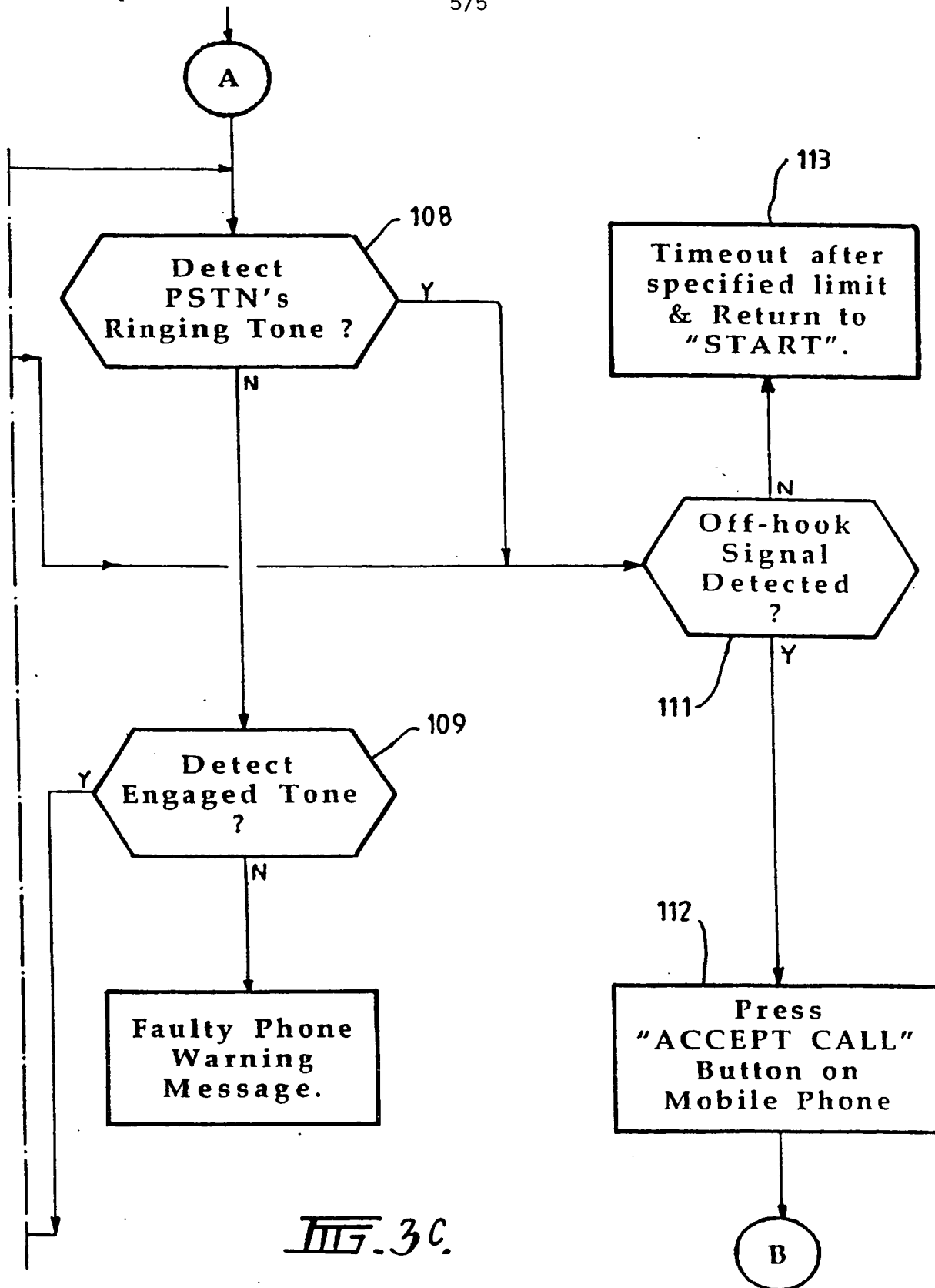
FIG. 2.



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FIG. 3b

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**FIG. 30.**

INTERNATIONAL SEARCH REPORT

International Application No.
PCT/SG 98/00026

A. CLASSIFICATION OF SUBJECT MATTER				
Int Cl ⁶ : H04Q 7/32, H04M 1/03, 1/21				
According to International Patent Classification (IPC) or to both national classification and IPC				
B. FIELDS SEARCHED				
Minimum documentation searched (classification system followed by classification symbols) IPC: H04B, H04M, H04Q				
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched				
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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.		
X	WO 97/00792 A1 (PEIKER) 9 January 1997 whole document	1-10		
X	WO 94/22234 A1 (PROFINOR SA et al) 29 September 1994 see figure 4	1-10		
A	EP 617535 A2 (NOKIA MOBILE PHONES LTD) 28 September 1994 whole document	1-10		
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C (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent Document Cited in Search Report				Patent Family Member			
WO	9700792	EP	833762	EP	808256	WO	9725223
		WO	9811747	EP	831667		
WO	9422234	AU	61558/94	CA	2158481	EP	691051
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EP	617535	GB	2276514	JP	7030626		
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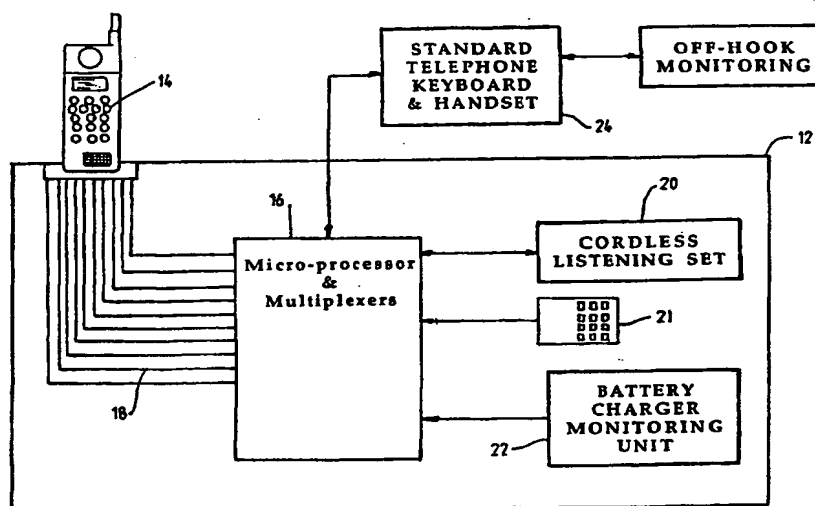
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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(71)(72) Applicant and Inventor: CHEW, Moh, Jin [SG/SG]; 5 Lermitt Road, Singapore 258638 (SG).			
(74) Agent: SACHITHANANTHAN, Suresan; Tan, Rajah & Cheah, Straits Trading Building, 9 Battery Road #15-00, Singapore 049910 (SG).		Published With international search report.	

(54) Title: TELEPHONE ADAPTOR APPARATUS



(57) Abstract

A mobile to stationary telephone adaptor apparatus for connecting a cellular network of a mobile telephone to a corded or cordless stationary telephone handset. The apparatus includes a docking station (12) for the mobile telephone and a controller (16) operatively connected to the docking station (12) and which is adapted to be operatively connected to the stationary telephone handset (20, 24). The controller (16) controls operation of the mobile telephone (14) when mounted and activated in the docking station (12) so that the stationary telephone handset (20, 24) can be employed by a user to connect to the cellular network. The docking station (12) may also incorporate an auxiliary keypad (21) for making outgoing telephone calls using the stationary telephone handset (20). The docking station (12) may also incorporate a battery charger (22) connected to the controller (16) and designed to charge a battery of the mobile telephone (14) in a standby mode.

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